

1 What is claimed is:  
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3 1. A pointing system for pointing a boresight along a desired  
4 line-of-sight in response to a command to point the boresight  
5 along the desired line-of-sight, the system comprising,  
6 a base for providing a platform and for coupling base motion  
7 and line-of-sight motion of the boresight for providing a  
8 mechanical excitation,  
9 a gimbal system comprising an elevation gimbal and an  
10 azimuth gimbal for positioning a boresight along the desired  
11 line-of-sight relative to the base, the elevation gimbal and  
12 the azimuth gimbal are modeled by a plant, the elevation gimbal  
13 and the azimuth gimbal comprise a suspension modeled by a  
14 compliance receiving the mechanical excitation and providing a  
15 compliance signal, the elevation gimbal and the azimuth gimbal  
16 are controlled by a torque signal being a sum of a compliance  
17 signal and a drive signal,  
18 a resolver system comprising an elevation resolver and an  
19 azimuth resolver for respectively measuring as resolver  
20 responses a relative elevation angle and a relative azimuth  
21 angle of the boresight relative to the base,  
22 a resolver filter system for resolver filtering of the  
23 resolver responses for providing a filtered resolver response,  
24 the mechanical excitation being applied to the resolver system  
25 for providing the resolver responses,  
26 a gyro system comprising X and Y and Z gyros for measuring  
27 as gyro responses X and Y and Z angular rates of the base  
28 motion,

1 a gyro filter for gyro filtering of the gyro responses for  
2 providing filtered gyro responses, and

3 a controller comprising gimbal motors for receiving a  
4 control input and providing motion control to the elevation  
5 gimbal and the azimuth gimbal, the control input signal being a  
6 sum of the command and the filtered resolver responses and the  
7 filtered gyro responses.

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9 2. The system of claim 1 wherein,

10 the gyro system has high frequency responses effectively  
11 attenuated by the gyro filter.

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13 3. The system of claim 1 wherein,

14 the resolver system has a high frequency response  
15 effectively attenuated by the resolver filter.

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17 4. The system of claim 1 wherein,

18 the gyro system is an inertial reference unit.

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20 5. The system of claim 1 wherein,

21 the base motion comprises vibrations.

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23 6. The system of claim 1 wherein,

24 the base motion comprise trajectory motions of a moving  
25 spacecraft coupled to the base.

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1 7. The system of claim 1 wherein,  
2 the controller and plant and compliance and resolver system  
3 are part of a closed-loop system having a system bandwidth,  
4 the resolver system has a resolver frequency response  
5 greater than the system bandwidth, and  
6 the resolver filter serves to shape the resolver response  
7 to reduce high frequency components of the resolver responses.

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9 8. The system of claim 1 wherein,  
10 the controller and plant and compliance and resolver system  
11 are a part of a closed-loop system having a system bandwidth,  
12 the gyro system has a gyro frequency response greater than  
13 the system bandwidth, and  
14 the gyro filter serves to shape the gyro response to reduce  
15 high frequency components.

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18 9. The system of claim 1 wherein,  
19 the controller and plant and compliance and resolver system  
20 and resolver system are part of a closed-loop system having a  
21 system bandwidth,  
22 the resolver system has a resolver frequency response  
23 greater than the system bandwidth, and  
24 the gyro system has a gyro frequency response greater than  
25 the system bandwidth, the resolver frequency response is  
26 greater than the gyro frequency response,  
27 the resolver filter and gyro filter serves to match the  
28 resolver frequency response to the gyro frequency response.

1 10. The system of claim 1 wherein,  
2 the controller and plant and compliance and resolver system  
3 and resolver system are part of a closed-loop system having a  
4 system bandwidth,  
5 the resolver system has a resolver frequency response  
6 greater than the system bandwidth, and  
7 the gyro system has a gyro frequency response greater than  
8 the system bandwidth, the resolver frequency response is  
9 greater than the gyro frequency response,  
10 the resolver filter and gyro filter serves to match the  
11 resolver frequency response to the gyro frequency response  
12 above the system bandwidth.  
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16 11. The system of claim 1 wherein,  
17 the controller and plant and compliance and resolver system  
18 are part of a closed-loop system have a system bandwidth, and  
19 the gyro system is part of a feed forward loop.  
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1 12. A pointing system for pointing a boresight along a desired  
2 line-of-sight in response to a command to point the boresight  
3 along the desired line-of-sight, the system comprising,  
4 a base for providing a platform and for coupling base motion  
5 and line-of-sight motion of the boresight for providing a  
6 mechanical excitation,  
7 a gimbal system comprising an elevation gimbal and an  
8 azimuth gimbal for positing a boresight along the desired line-  
9 of-sight relative to the base, the elevation gimbal and the  
10 azimuth gimbal are modeled by a plant, the elevation gimbal and  
11 the azimuth gimbal comprise a suspension modeled by a  
12 compliance receiving the mechanical excitation, the elevation  
13 gimbal and the azimuth gimbal are controlled by a torque signal  
14 being a sum of a compliance signal from the modeled compliance  
15 and a drive signal,  
16 a gyro system comprising X and Y and Z gyros for measuring  
17 as gyro responses the X and Y and Z angular rates of the base  
18 having the base motion,  
19 a gyro filter for gyro filtering of the gyro responses for  
20 providing filtered gyro responses,  
21 a controller comprising gimbal motors for receiving a  
22 control input and providing motion control to the elevation  
23 gimbal and the azimuth gimbal, the control input signal being a  
24 sum of the command and the filtered gyro responses.  
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1 13. A pointing system for pointing a boresight along a desired  
2 line-of-sight in response to a command to point the boresight  
3 along the desired line-of-sight, the system comprising,  
4 a base for providing a platform and for coupling base  
5 disturbances to the line-of-sight of the boresight for  
6 providing a mechanical excitation,  
7 a gimbal system comprising an elevation gimbal and an  
8 azimuth gimbal for positing a boresight along the desired line-  
9 of-sight relative to the base, the elevation gimbal and the  
10 azimuth gimbal are modeled by a plant, the elevation gimbal and  
11 the azimuth gimbal comprise a suspension modeled by a  
12 compliance receiving the mechanical excitation, the elevation  
13 gimbal and the azimuth gimbal are controlled by a torque signal  
14 being a sum of a compliance signal from the modeled compliance  
15 and a drive signal,  
16 a resolver system comprising an elevation resolver and an  
17 azimuth resolver for respectively measuring a relative  
18 elevation angle and a relative azimuth angle of the boresight  
19 relative to the base as resolver responses,  
20 a resolver filter system for resolver filtering of the  
21 resolver responses for providing a filtered resolver response,  
22 the mechanical excitation being applied to the resolver system  
23 for providing the resolver responses,  
24 a controller comprising gimbal motors for receiving a  
25 control input and providing motion control to the elevation  
26 gimbal and the azimuth gimbal, the control input signal being a  
27 sum of the command and the filtered resolver responses.  
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